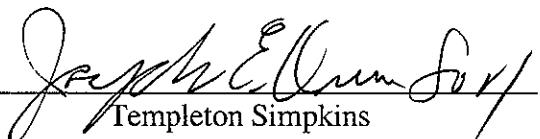

Work Order No. 03917.008.013

**No. 2 Combination Boiler
Particulate Matter
Emission Compliance Test Report
Bowater Incorporated
Catawba, South Carolina
22 July 2008**

Prepared For

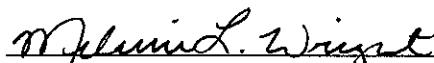
BOWATER INCORPORATED

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Templeton Simpkins

Project Manager
Approved for Transmittal



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19 August 2008



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SECTION 1 INTRODUCTION

Weston Solutions, Inc. (WESTON[®]) was retained by Bowater Incorporated (Bowater) to conduct particulate matter (PM) emission testing on No. 2 Combination Boiler at the mill in Catawba, South Carolina. The purpose of the testing was to demonstrate compliance with the South Carolina Department of Health and Environmental Control (DHEC) permit limits.

WESTON performed the emission testing on 22 July 2008. The project team included the following individuals.

Name	Project Role
Templeton Simpkins	Project Manager
Melanie Wright	Quality Assurance Manager
Robert Griffin	Test Team Leader
Mark Fowler	Test Team Member
Natalie Hornsby	Report Coordinator

Mr. Will Hinson of Bowater coordinated the testing with mill operations and served as WESTON's technical contact throughout the effort. A representative of DHEC was not present during the testing.



SECTION 2 RESULTS AND DISCUSSION

Table 2-1 provides a detailed summary of the emission results, with comparison to the permit limit. Any differences between the calculated results presented in the appendices and the results reported in the summary table are due to rounding for presentation.

**TABLE 2-1
No. 2 COMBINATION BOILER
SUMMARY OF PM EMISSION RESULTS**

	Run 1	Run 2	Run 3	Mean
Date	7/22/08	7/22/08	7/22/08	----
Time Began	1342	1524	1700	----
Time Ended	1451	1630	1806	----
Stack Gas Data				
Temperature, °F	408	416	417	414
Velocity, ft/sec	77	78	77	77
Moisture, %	16	15	15	15
CO ₂ Concentration, %	8.1	8.2	8.1	8.1
O ₂ Concentration, %	12.0	11.8	11.8	11.9
VFR, x 10 ⁵ dscfm	1.82	1.83	1.81	1.82
Particulate Matter				
Isokinetic Sampling Rate, %	99	99	99	99
Concentration, gr/dscf	0.051	0.051	0.062	0.055
Emission Rate, lb/hr	80	80	96	85
Emission Factor, lb/MMBtu	0.165	0.162	0.197	0.175
Permit Limit, lb/MMBtu	----	----	----	0.6



SECTION 3

SOURCE TESTING METHODOLOGY

The emission testing program was conducted in accordance with the U.S. EPA Reference Methods summarized in Table 3-1. Method descriptions and quality assurance data are provided in the referenced appendices.

TABLE 3-1
SOURCE TESTING METHODOLOGY

Parameter	Method Number	Appendix Reference		Comments
		Method Description	Quality Control Data	
Volumetric Flow Rate	1,2,3A,4	B.1	D	
Particulate Matter	5	B.2	D	

Instrumental analysis was performed on integrated bag samples to determine oxygen (O_2) and carbon dioxide (CO_2) concentrations.

Post-test equipment calibrations for the probe and pitot will be maintained on file at WESTON.



APPENDIX A

SAMPLE CALCULATIONS

SAMPLE CALCULATIONS

No. 2 Combination Boiler Run No. 1

Meter Pressure (Pm), in. Hg

$$P_m = P_b + \frac{\Delta H}{13.6 \text{ in. } H_2O/\text{in. Hg}}$$

where, Pb = barometric pressure, in. Hg
 ΔH = Pressure differential of orifice in. H₂O

Absolute Stack Gas Pressure (Ps), in. Hg

$$P_s = P_b + \frac{P_g}{13.6 \text{ in. } H_2O/\text{in. Hg}}$$

where, Pb = barometric pressure, in. Hg
Pg = Static Pressure, in. H₂O

Standard Meter Volume (Vmstd), dscf

$$V_{mstd} = \frac{17.64 \text{ } ^\circ R/\text{in. Hg} \times Y \times V_m \times P_m}{T_m}$$

where, Y = meter correction factor
V_m = meter volume, cf
P_m = meter pressure, in. Hg
T_m = meter temperature, °R

Standard Wet Volume (Vwstd), scf

$$V_{wstd} = 0.04707 \text{ ft}^3/\text{mL} \times V_{lc}$$

where, V_{lc} = volume of H₂O collected, mL

Moisture Fraction (Measured), (Bws)

$$B_{ws} = \frac{V_{wstd}}{(V_{wstd} + V_{mstd})}$$

where, V_{wstd} = standard wet volume, scf
V_{mstd} = standard meter volume, dscf

Moisture Fraction (at saturation), (Bws)

$$Bws = \frac{Vp}{Ps}$$

Moisture, % (M%)

$$M\% = Bws \times 100$$

where, Bws = moisture fraction, measured or at saturation, whichever is lowest

Molecular Weight (DRY) (Md), lb/lb-mole

$$Md = (0.44 x \% CO_2) + (0.32 x \% O_2) + (0.28(100 - \% CO_2 - \% O_2))$$

Molecular Weight (WET) (Ms), lb/lb-mole

$$Ms = Md (1 - Bws) + 18(Bws)$$

where, Md = molecular weight (DRY), lb/lb-mole
Bws = moisture fraction, dimensionless

Average Velocity (Vs), ft/sec

$$Vs = 85.49 \frac{ft}{sec} \sqrt{\frac{(lb/lb - mole)(in. Hg)}{(^oR)(in. H_2O)}} \times Cp \times \sqrt{Delta P \text{ avg.}} \times \sqrt{\frac{T_s}{Ps \times Ms}}$$

where, Cp = pitot tube coefficient
Delta P = velocity head of stack gas, in. H₂O
T_s = absolute stack temperature, °R
Ps = absolute stack gas pressure, in. Hg
Ms = molecular weight of stack gas, lb/lb-mole

Average Stack Gas Flow at Stack Conditions (Qa), acfm

$$Qa = 60 \text{ sec/min} \times Vs \times As$$

where, Vs = stack gas velocity, ft/sec
As = cross-sectional area of stack, ft²

Average Stack Gas Flow at Standard Conditions (Qs), dscfm

$$Qs = 17.64 \frac{^oR}{in. Hg} \times Qa \times (1 - Bws) \times \frac{Ps}{Ts}$$

where, Qa = average stack gas flow at stack conditions, ft³/min
Bws = moisture content (dimensionless)
Ps = absolute stack gas pressure, in. Hg
Ts = absolute stack temperature, °R

Percent Isokinetic Sampling Rate (%I)

$$\% I = \frac{0.0945(\text{in. Hg})(\text{min})/(\text{°R})(\text{sec}) \times T_s \times V_{mstd}}{P_s \times V_s \times A_n \times \Theta \times (1 - B_{ws})}$$

where,
 Ts = avg. stack temperature, °R
 Vmstd = standard meter volume, dscf
 Ps = absolute stack gas pressure, in. Hg
 Vs = stack gas velocity, ft/sec
 An = cross-sectional area of nozzle, ft²
 Θ = total sampling time, min
 Bws = moisture content (dimensionless)

Particulate Matter Concentration at Standard Conditions (Cs), gr/dscf

$$Cs = 15.43 \frac{gr}{g} \times \frac{Mn}{V_{mstd}}$$

where, Mn = particulate matter collected, g
 Vmstd = std. meter volume, dscf

Particulate Matter Emission Rate (PMR), lb/hr

$$PMR = \frac{Cs \times Q_s \times 60 \frac{\text{min}}{\text{hr}}}{7000 \frac{\text{gr}}{\text{lb}}}$$

where, Cs = particulate conc. at std. cond., gr/dscf
 Qs = avg. stack gas flow at std. cond., dscf/min

PM Emission Factor (EMF), lb/MMBtu (correcting for O₂)

$$EMF = PM \text{ conc.} \frac{gr}{dscf} \times \frac{lb}{7,000 \text{ gr}} \times F - \text{Factor}, \frac{dscf}{MMBtu} \times \frac{20.9}{20.9 - \% O_2}$$

where, Pm conc. = Cs
 F-Factor = defined by client or CFR, scf/MMBtu

Prorated F-Factor Calculation

$$\text{Prorated F - Factor} = \left(9,600 \frac{\text{dscf}}{\text{MMBtu}} x \% \text{ Heat Input} \right) + \left(9,190 \frac{\text{dscf}}{\text{MMBtu}} x \% \text{ Heat Input} \right) + \\ \left(8,710 \frac{\text{dscf}}{\text{MMBtu}} x \% \text{ Heat Input} \right) + \left(15,500 \frac{\text{dscf}}{\text{MMBtu}} x \% \text{ Heat Input} \right) \div 100$$

where, 9,600 dscf/MMBtu is the Bark F-Factor

9,190 dscf/MMBtu is the Oil F-Factor

15,500 dscf/MMBtu is the TDF F-Factor

8,710 dscf/MMBtu is the Gas F-Factor



APPENDIX B

TEST METHODOLOGY

B.1 VOLUMETRIC FLOW RATE

B.2 PARTICULATE MATTER

B.1 VOLUMETRIC FLOW RATE

Mass emission rates are calculated by multiplying measured target analyte concentrations by calculated volumetric flow rates. Volumetric flow rates are calculated using measurement data obtained by EPA Reference Methods 1-4.

The ductwork is measured at the sample location to the nearest 0.25 inch using a steel tape measure. Traverse points are selected in accordance with EPA Reference Method 1 on the basis of ductwork dimensions, geometry, and upstream and downstream disturbances. When a sample location does not meet EPA Reference Method 1 criteria, the maximum recommended number of traverse points is used.

Gas Velocity

The velocity of the gas stream is measured in accordance with EPA Reference Method 2 by reading the instantaneous velocity pressure with an inclined manometer at each traverse point using either a standard "P" type or an "S" type pitot tube. The stack pressure is calculated from the measured static pressure of the stack and the ambient barometric pressure. The static pressure is measured by using the static side of the pitot tube, and the barometric pressure is measured using a calibrated aneroid barometer. Magnahelic® gauges with scales of 0 to 5 and 0 to 25 inches of water or an inclined manometer with a scale of 0 to 10 inches of water are used for velocity pressure measurements. Manometer selection is determined by the velocity pressure of the gas stream. A manometer with a 0 to 0.25 inch scale may be used when the velocity pressure of the gas stream is less than 0.02 inches of water. By convention, any measured velocity pressures of less than 0.005 inches of water are recorded and reported as less than 0.005 inches of water. The stack temperature is measured with a calibrated thermocouple and pyrometer.

For low velocity pressure measurements (less than 0.005 inches of water) a hot wire anemometer may be used to measure the velocity of the gas stream. The indicated velocity is used without correction when the gas stream is ambient air with a moisture content of less than 65%. The indicated velocity is corrected in accordance with procedures specified by the manufacturer when the moisture content exceeds 65% or when the dry gas fraction is something other than ambient air.

Gas Composition and Moisture Content

The composition of the gas stream is measured in accordance with EPA Reference Method 3A using an analyzer.

Integrated samples are collected by withdrawing a sample from the source through a moisture condenser into a Tedlar® sample bag. The bag is then analyzed using a calibrated O₂/CO₂ analyzer.

The moisture content of the gas stream is determined using one of the following procedures:

- For sources requiring testing by EPA Reference or Test Methods 5, 8, 12, 13, 17, 23, 26A, 29, 0010, or 0011, moisture is determined by EPA Reference Method 4. At the conclusion of each run the volume of condensed moisture in the impingers of the sampling train is measured and used to calculate the moisture content of the gas stream.
- For sources with temperatures greater than 212 °F, the approximation technique described in EPA Reference Method 4 may be used with midget impingers to condense moisture before dry gas volume measurement.
- For sources with a temperature of less than 212 °F, wet bulb/dry bulb temperature measurements may be made, and the moisture content calculated using vapor pressure tables.

When multiple methods are used for moisture determinations, the lowest moisture value is used for volumetric flow calculations.

The molecular weight of the gas stream is calculated using the measured moisture, oxygen, and carbon dioxide concentrations. The balance of the gas stream is assumed to be nitrogen. The volumetric flow is then calculated at stack and standard conditions using the calculated molecular weight, the measured stack temperature, and measured velocity, stack and barometric pressures. Standard conditions are 68 °F and 29.92 inches of mercury and 0% moisture.

Data Acquisition and Reporting

Data are recorded at the time of collection on preprinted data sheets. Calculations are performed (where possible) with preprogrammed calculators or spreadsheet software.

Quality Control

Quality control procedures for volumetric flow measurements involve leak checks of pitot tubes, pitot tube lines and manometers; periodic analysis of ambient air and duplicate analysis of source gas samples with the Fyrite analyzer; triplicate analysis with the Orsat analyzer; and periodic calibration checks of thermocouples and pyrometers.

Data transfers are minimized. Data sheets are checked for completeness and accuracy. Calculations are verified by a second person.

B.2 PARTICULATE MATTER

Particulate matter (PM) emission testing is conducted using EPA Reference Method 5. EPA Reference Methods 1-4 are used, as appropriate, for traverse point selection, determination of stack gas molecular weight, stack gas moisture determination, and volumetric flow rate.

Sampling Equipment and Procedures

The sampling train utilized to perform the PM sampling is an EPA Reference Method 5 train manufactured by Graseby-Nutech, Graseby-Anderson, or Apex Instruments (see Figure B-1). A measured borosilicate, quartz glass, or stainless steel (316) nozzle is attached to a heated (248 ± 25 °F) borosilicate or quartz glass, or stainless steel probe of appropriate length. The probe is connected to a heated (248 ± 25 °F) borosilicate glass filter holder containing a 9-cm glass fiber filter (preweighed to a constant 0.1 mg weight). The first and second impingers each contain 100 mL of distilled water, the third impinger is empty, and the fourth impinger contains 200 to 300 grams of dry preweighed silica gel. The second impinger is a standard Greenburg-Smith type. The first, third, and fourth impingers are of a modified design. All impingers are maintained in a crushed ice bath. A gas measuring control console with a leak-free vacuum pump, a calibrated dry gas meter, a calibrated orifice, and inclined manometers are connected to the final impinger, probe, heated filter holder, and pitot tube via an umbilical cord to complete the train.

Flue gas velocity is measured with a calibrated S-type pitot tube (provided with extensions) fastened alongside the sampling nozzle. Flue gas temperature is monitored with a calibrated direct readout pyrometer equipped with a chromel-alumel (Type K) thermocouple positioned near the sampling nozzle. The probe, filter box, and impinger exit gas temperatures are monitored with a calibrated direct readout pyrometer equipped with Type K thermocouples positioned in the probe, heated filter chamber, and in the sample gas stream after the last impinger. Stack gas stream composition (carbon dioxide and oxygen content) is determined as previously described. The sampling rate is adjusted, based on stack velocity, at each point to ensure the sample is collected isokinetically.

At the conclusion of each test, the sampling train is leak checked. Upon completion of a successful leak check, the sampling train is dismantled, openings are sealed, and the components recovered as described below.

- The glass fiber filter(s) is/are removed from its holder with tweezers and placed in its original container, along with any particulate and filter fragments (Sample Fraction 1).

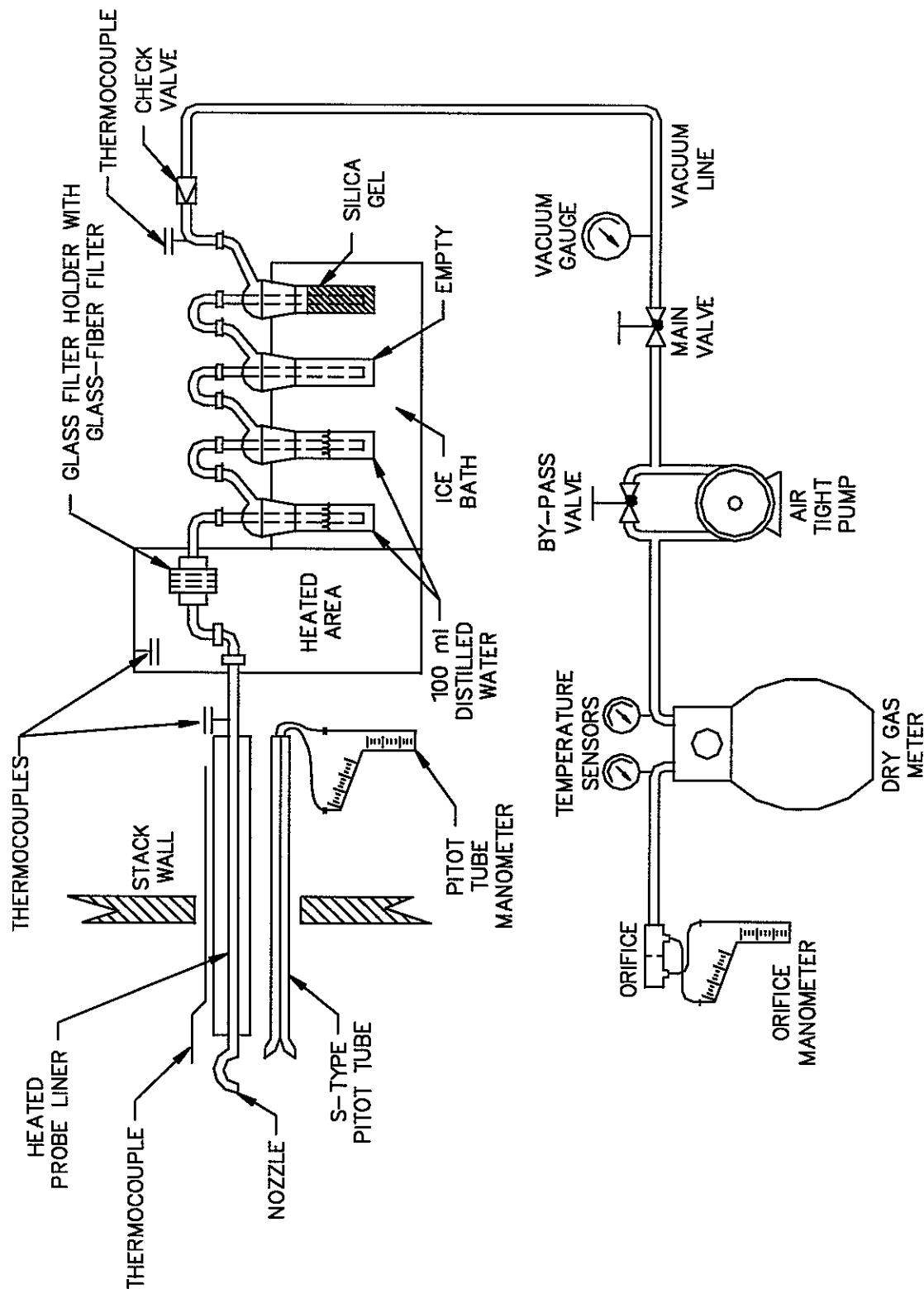


Figure B-1 EPA Reference Method 5 Sampling Train

- The probe and nozzle are separated and the particulate rinsed with distilled water or acetone into a polyethylene container while brushing a minimum of three times. Particulate adhering to the brush is rinsed with the appropriate solvent into the same container. The front half of the filter holder and connecting glassware are also rinsed. These rinses are combined (Sample Fraction 2).
- The total liquid content of impingers one, two, and three are measured volumetrically for stack gas moisture content calculation. This liquid is discarded.
- The silica gel is removed from the last impinger and immediately weighed to the nearest 0.1 g for stack gas moisture content calculation.
- Aliquots of the appropriate solvents and a filter are retained for blank analyses.

Each sample bottle is labeled to clearly identify its contents. The liquid level is marked on each bottle. The samples are then secured for transport to a laboratory for analysis. Sample integrity is assured by maintaining chain-of-custody records.

Sample Analysis

The particulate analysis proceeds as follows:

- The sample filters (Sample Fraction 1) and blank filter are desiccated for 24 hours and weighed to the nearest 0.1 mg to constant (± 0.5 mg) weight.
- The nozzle, probe, and front half of the filter holder wash samples (Sample Fraction 2), along with the solvent blank, are evaporated in tared beakers, then desiccated and weighed to the nearest 0.1 mg to constant (± 0.5 mg) weights.

The total weight of material measured in the front half wash in addition to the weight of material collected on the glass fiber filter represent the total PM catch for each train. Blank corrections are made where appropriate for all sample weights.

Data Acquisition and Reduction

Data are recorded at the time of collection on preprinted data sheets. Calculations are performed with preprogrammed calculators or spreadsheet software. Data transfers are minimized. Field and laboratory data sheets are checked for completeness and accuracy. Calculations are verified by a second person.

Quality Control

Dry gas meters are calibrated before and after sampling. Thermocouples are calibrated against mercury thermometers, and aneroid barometers are calibrated against a mercury barometer. WESTON participated satisfactorily in the most recent dry gas meter audit supplied by the EPA. Those data are on file at WESTON.

Prior to and following each run, the sampling train is leak checked. An acceptable leak rate does not exceed the lesser of 0.02 actual cubic feet per minute (acf m) or 4% of the actual sampling rate. The isokinetic sampling rate is calculated at the completion of each sample run. If the isokinetic sampling rate is not within $100\% \pm 10\%$, the sample run is repeated.

Samples are transported to the laboratory under chain-of-custody. Solvent blanks and filter blanks are analyzed at the same time as the samples. The mass collected on the filters and the mass in the probe wash are corrected by the blank measurements.

WESTON uses Class S weights during each stage of the analysis to verify the accuracy of the balance. The balance is repaired and recalibrated before proceeding if there is a significant difference in the actual mass and measured mass.



APPENDIX C

FIELD DATA – NO. 2 COMBINATION BOILER

Bowater
Catawba, SC

03917.008.013
No. 2 Combination Boiler

ISOKINETIC CALCULATIONS

Run Number		1	2	3	Mean
Date	7/22/2008	7/22/2008	7/22/2008	---	---
Time Began	1342	1524	1700	---	---
Time Ended	1451	1630	1806	---	---
INPUT DATA					
Sampling Time, min	(Theta)	60.0	60	60	60
Stack Diameter, in.	(Dia.)	120.00	120.00	120.00	120.00
Barometric Pressure, in. Hg	(Pb)	29.32	29.32	29.32	29.32
Static Pressure, in. H2O	(Pg)	-0.69	-0.69	-0.69	-0.69
Pitot Tube Coefficient	(Cp)	0.84	0.84	0.84	0.84
Meter Correction Factor	(Y)	0.9930	0.9930	0.9930	0.9930
Orifice Calibration Value	(Delta H@)	1.8130	1.8130	1.8130	1.8130
Nozzle Diameter, in.	(Dn)	0.235	0.235	0.235	0.235
Meter Volume, ft^3	(Vm)	45.618	46.497	46.014	46.043
Meter Temperature, °F	(Tm)	107.4	113.9	114.9	112.1
Meter Temperature, °R	(Tm-R)	567.4	573.9	574.9	572.1
Meter Orifice Pressure, in. H2O	(Delta H)	1.763	1.807	1.779	1.783
Ave Sq Rt Orifice Press, (in. H2O)^½	((Delta H)½)avg	1.328	1.342	1.331	1.334
Volume H2O Collected, mL	(Vlc)	163.0	160.9	158.2	160.7
CO2 Concentration, %	(CO2)	8.1	8.2	8.1	8.1
O2 Concentration, %	(O2)	12.0	11.8	11.8	11.9
Ave Sq Rt Velo Head, (in. H2O)^½	((Delta P)½)avg	1.040	1.047	1.038	1.042
Stack Temperature, °F	(Ts)	408.0	416.2	417.1	413.8
Stack Temperature, °R	(Ts-R)	868.0	876.2	877.1	873.8
Particulate Collected, g	(Mn)	0.1371	0.1390	0.1652	0.1471
O2 F Factor, dscf/MMBtu	(Fd)	9644	9644	9708	9665
CALCULATED DATA					
Nozzle Area, in²	(An)	0.0433736	0.0433736	0.0433736	0.04
Stack Area, ft²	(As)	78.54	78.54	78.54	78.54
Stack Pressure, in. Hg	(Ps)	29.27	29.27	29.27	29.27
Meter Pressure, in. Hg	(Pm)	29.45	29.45	29.45	29.45
Standard Meter Volume, ft³	(Vmstd)	41.474	41.799	41.290	41.521
Standard Water Volume, ft³	(Vwstd)	7.672	7.574	7.446	7.564
Moisture Fraction (Measured)	(BWS)	0.156	0.153	0.153	0.154
Moisture Fraction (lower sat/meas)	(BWS)	0.156	0.153	0.153	0.154
Mol. Wt. of Dry Gas, lb/lb-mole	(Md)	29.78	29.78	29.77	29.78
Mol. Wt. of Stack Gas, lb/lb-mole	(Ms)	27.94	27.98	27.97	27.96
Average Stack Gas Velocity, ft/sec	(Vs)	76.95	77.78	77.16	77.29
Stack Gas Flow, actual, ft³/min	(Qa)	362601	366508	363586	364232
Stack Gas Flow, Std , ft³/min	(Qs)	182014	182840	181325	182060
Isokinetic Sampling Rate, %	(%I)	99.0	99.4	99.0	99.1
Particulate Conc @ Std Cond, gr/ft³	(Cs)	0.051	0.051	0.062	0.055
Particulate Emission, lb/hr	(PMR)	79.563	80.402	95.934	85.30
Particulate Emission Factor, lb/MMBtu	(Fd)	0.1650	0.1624	0.1966	0.1747
Calibration check	(Yqa)	1.0036	1.0005	1.0039	1.003
Percent difference from Y					0.98%

CLIENT :
 WESTON W.O. No. :
 Date Received :
 Analyst :

Balance ID: Mettler AE163
 Density of Acetone (g/mL): 0.7848
 Lab Ambient Temp (F): 68.7
 Lab Rel Humidity (%): 48
 Barometric Pressure (Hg): 29.32

Source	ONE	TWO	THREE	FIELD BLANK
Field Run No.				
LIQUID FRACTION				
Probe Wash ID	DA 0125	DA 0126	DA 0127	
Beaker ID	1-07	2-07	3-07	4-07
Liquid Volume (mL)	140	100		100
Initial Beaker Weights (g)				
Weight #1	111.1587	123.3458	112.6622	124.4899
Weight #2	111.1587	123.3460	112.6626	124.4904
Average Initial Weight (g)	111.1587	123.3459	112.6624	124.4902
Final Beaker Weights (g)				
Weight #1	111.1720	123.3572	112.6752	124.4890
Weight #2	111.1716	123.3574	112.6750	124.4892
Average Final Weight (g)	111.1718	123.3573	112.6751	124.4891
Final-Initial Beaker Wts. (g)	0.0131	0.0114	0.0127	-0.0011
Sample/Blank Volume Ratio	1.4000	1.0000	0.0000	
Liquid Blank Correction (g)	-0.0011	-0.0011	-0.0011	
Liquid Particulate Weight (g)	0.0142	0.0125	0.0138	-0.0011
FILTER FRACTION				
Filter ID	DA 0125	DA 0126	DA 0127	0.0000
Initial Filter Weights (g)				
Weight #1	33.6226	39.8218	43.9816	
Weight #2	33.6228	39.8214	43.9817	
Average Initial Weight (g)	33.6227	39.8216	43.9817	0.0000
Final Filter Weights (g)				
Weight #1	33.7458	39.9481	44.1331	
Weight #2	33.7453	39.9481	44.1331	
Average Final Weight (g)	33.7456	39.9481	44.1331	0.0000
Final-Initial Filter Wts. (g)	0.1229	0.1265	0.1514	0.0000
Filter Blank (g)	0.0000	0.0000	0.0000	
Filter Particulate Weight (g)	0.1229	0.1265	0.1514	
SUMMARY				
Filter Particulate Weight (g)	0.1229	0.1265	0.1514	
Liquid Particulate Weight (g)	0.0142	0.0125	0.0138	
Net Particulate Weight (g)	0.1371	0.1390	0.1652	

Sample Recovery Solution

Acetone

Weight Percent of Blank

-0.0014%

Liquid Fraction

Note: If the blank liquid fraction has a residue weight percent of greater than 0.001 percent, then the samples are not blank corrected.

ISOKINETIC FIELD DATA SHEET

Boule, S. C. Project ID: 239127 D018, Q13

Client	W.O.#	Stack Conditions	Meter Box ID	Meter Box Y	K Factor	Method	Avg 2.0
Project ID	Model/Source ID	Assumed	Actual	Meter Box Del H	Initial	Mid-Point	Final
Samp. Loc. ID	TRI-AUX	% Moisture Impinger Vol (ml)	146	146	1.813	1.813	1.813
Run No. ID	TRI-2	Silica gel (g)		Probe ID / Length	Avg 16.56	Leak Checks	Q12.2
Test Method ID	S	CO2, % by Vol	29.8	Probe Material	33	Sample Train (ft ³)	6
Date ID	2023-01-08	O2, % by Vol	11.2	Pilot Thermocouple ID	33	Leak Check @ (in Hg)	
Source/Location	CATANIA, SC	Temperature (°F)	11.2	Pilot Coefficient	8.4	Pilot good	
Sample Date	2023-01-08	Meter Temp (°F)	11.2	Nozzle ID	2.35	Orsat good	
Baro. Press (in Hg)	24.32	Static Press (in H2O)	-0.6	Avg Nozzle Dia (in)	2.35	Temp Check	
Operator	EE-B/INF	Ambient Temp (°F)	1524	Area of Stack (ft ²)	10.0	Meter Box Temp	
				Sample Time	10.0	Reference Temp	
				Total Traverse Pts	24	Pass/Fail (+/- 2°)	
					24	Pass / Fail	
					yes / no	yes / no	

TRAVERSE POINT NO.	STATION TIME	VELOCITY	DRY GAS METER PRESSURE DATA (in H2O)	OPACITY PRESSURE DATA (in H2O)	STACK TEMPERATURE (°F)	DEVIATION FROM NIST TEMP (°F)	DET OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (°F)	IMPINGER EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)	COMMENTS
1 - 2	2.5	1.20	1.96	42.3	41.2	N/A	112	249	252	232	4	
2	2.5	1.20	2.0	45.3	41.4		113	245	247	20.0	4	
3	7.5	1.20	2.0	47.7	41.1		113	244	248	6.0	4	
4	1.0	1.20	2.0	49.2	41.5		113	241	249	6.0	4	
5	12.5	1.20	2.0	51.2	41.4		114	250	249	6.2	4	
6	1.5	1.20	2.0	52.2	41.3		113	248	249	6.1	4	
7 - 1	17.5	1.20	2.0	53.2	41.2		114	250	250	6.4	5	
2	2.0	1.10	1.8	53.1	41.2		114	248	249	6.3	5	
3	22.5	1.10	1.8	57.0	41.8		114	244	245	6.2	5	
4	2.5	1.00	1.6	61.0	41.8		113	243	245	6.1	5	
5	27.5	0.80	1.4	62.4	41.7		113	244	249	6.0	5	
6	3.0	0.80	1.3	64.3	41.6		113	242	247	6.0	5	
7 - 2	32.5	1.20	2.0	66.3	41.5		113	246	249	6.3	5	
2	2.5	1.10	1.8	68.2	42.0		113	245	248	6.2	5	
3	37.5	1.10	1.8	70.2	41.9		113	247	250	5.9	5	
4	4.0	1.10	1.8	72.2	41.9		113	245	248	5.8	5	
5	42.5	1.00	1.4	74.1	41.8		113	246	249	5.8	5	
6	45	0.90	1.5	75.9	41.8		113	246	249	5.8	5	
7 - 1	47.5	1.20	2.0	77.9	41.7		113	248	252	6.2	5	
2	50	1.10	1.8	79.6	41.7		113	249	248	6.0	5	
3	52.5	1.10	1.8	81.4	41.7		113	248	249	5.9	5	
4	55	1.10	1.8	84.0	41.6		113	247	249	5.9	5	
5	57.5	1.10	1.8	85.8	41.6		113	250	248	5.9	5	
6	60	16.30	1.10	87.7	41.6		113	250	248	5.9	5	
			Avg Star Delta P	Total Volume	Avg Ts	Avg Tm	Min/Max	Max Temp	Max Vac	Max Temp		
			1.047	46,497	416.2	333.9	113	64	5			
			Avg Sqrt Del H	Comments:	1.342	BAL 14.9						
					1.807	1.8099.2						
					1.047	1.833.9						
					1.047	1.833.9						

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77.6

36.8
36.7
36.3

BAL 14.9

H1 - 236
H2 - 140
H3 - 4

PA - Q126

ISOKINETIC FIELD DATA SHEET

Client	EDWARD E. G.	Stack Conditions	Assumed	Actual	Meter Box ID	Meter Box Y	Meter Box Del H	Leak Checks				
W.O.#	05917.008.013	% Moisture			148	1.8	1.823	Sample Train (ft')				
Project ID	H2C-comb 119-B.C	Impinger Vol (ml)				25	25	Leak Check @ (in Hg)				
Samp. Loc. ID	STACK	Silica gel (g)						Pilot good				
Run No. ID	THREE-E	CO2, % by Vol						Orsat good				
Test Method ID	6	O2, % by Vol						Orsat good				
Date ID	22-301 08	Temperature (°F)						Post-Test Set				
Source/Location	CATAU BA S-L	Meter Temp (°F)						Post-Test Set				
Sample Date	22-301 08	Static Press (in Hg)						Pass / Fail				
Baro. Press (in Hg)	29.52	Avg Nozzle Dia (in)						Pass / Fail				
Operator	BLD	Ambient Temp (°F)						Pass / Fail				
TRAVERSE POINT NO.	TIME (min)	VELOCITY PRESSURE Delta H (H2O)	ORIFICE PRESSURE Delta H (H2O)	DRY GAS FLOW FEADING (ft')	STAG. TEMP (°F)	DOW. TEMP (°F)	PROBE TEMP (°F)	FILTER TEMP (°F)	IMPINGER TEMP (°F)	EXT TEMP (°F)	SAMPLE TRAIN VAC (in.Hg)	COMMENTS
A-1	2.5	1.2	3.0	94.1	111.6	111.0	24.3	24.4	24.4	62	4	
A-2	5	1.2	1.8	92.0	111.6	111.4	24.9	24.9	24.9	62	4	
A-3	7.5	1.2	1.8	95.1	111.6	111.4	25.1	25.1	24.4	54	4	
A-4	10	1.2	1.8	93.0	111.7	111.4	24.2	24.2	24.1	54	4	
A-5	12.5	1.2	1.8	98.9	111.7	111.4	24.3	24.3	24.1	54	4	
A-6	15	1.2	1.8	100.9	111.7	111.5	24.6	24.6	24.4	54	4	
B-1	17.5	1.2	2.0	102.4	111.6	111.4	24.6	24.6	24.5	60	4	
B-2	20	1.2	1.8	104.8	111.8	111.4	24.4	24.4	24.4	56	5	
B-3	22.5	1.2	1.8	106.7	111.7	111.5	24.7	24.7	24.4	54	5	
B-4	25	1.0	1.6	108.6	111.7	111.5	24.6	24.6	24.5	54	5	
B-5	27.5	.95	.6	110.4	111.7	111.5	24.6	24.6	24.5	55	5	
B-6	30	.90	.5	112.2	111.7	111.5	24.5	24.5	24.5	54	5	
C-1	32.5	1.20	2.0	114.2	111.6	111.5	24.7	24.7	24.7	61	5	
C-2	35	1.10	1.8	116.1	111.6	111.5	24.2	24.2	24.2	57	5	
C-3	37.5	1.00	1.6	118.0	111.6	111.5	24.0	24.0	24.0	56	5	
C-4	40	.95	.4	120.8	111.6	111.5	24.6	24.6	24.3	54	5	
C-5	42.5	.88	.4	121.5	111.6	111.5	24.7	24.7	24.7	53	5	
C-6	45	.75	.2	123.2	111.7	111.5	24.3	24.3	24.3	58	5	
D-1	47.5	1.20	2.0	125.1	111.7	111.6	24.8	24.8	24.5	62	5	
D-2	50	1.10	1.8	127.0	111.6	111.6	24.7	24.7	24.6	57	5	
D-3	52.5	1.20	2.0	129.4	111.6	111.6	24.9	24.9	24.7	56	5	
D-4	55	1.20	2.0	131.2	111.6	111.6	24.9	24.9	24.4	56	5	
D-5	57.5	1.20	2.0	133.2	111.6	111.6	24.8	24.8	24.5	56	5	
D-6	60.0	1.20	2.0	135.1	111.6	111.6	24.6	24.6	24.4	57	5	
				Total Volume	Avg TS	Avg TS	Min/Max	Min/Max	Min/Max	Max Temp	Max Temp	
				46.014	41.17.1	41.17.1	62	62	62	62	62	
				Avg Sqr Delta P	Avg Delt H							
				1.038	1.331							
				1.779	1.550							
				29.7	29.7							
				28.2	28.2							

Method

K Factor	1.61	Initial Mid-Point	Final
Meter Box ID	1.993	1.823	Leak Checks
Meter Box Y	1.823	1.823	Sample Train (ft')
Meter Box Del H	1.823	1.823	Leak Check @ (in Hg)
Probe ID / Length	1.823	1.823	Pilot good
Probe Material	1.823	1.823	Orsat good
Pilot / Thermocouple ID	1.823	1.823	Orsat good
O2, % by Vol	1.823	1.823	Orsat good
Nozzle ID	1.823	1.823	Orsat good
Pitot Coefficient	1.823	1.823	Orsat good
Avg Nozzle Dia (in)	1.823	1.823	Orsat good
Avg Nozzle Dia (ft')	1.823	1.823	Orsat good
Area of Stack (ft')	1.823	1.823	Orsat good
Sample Time	1.823	1.823	Orsat good
Total Traverse Pts	1.823	1.823	Orsat good
Temp Change Response?	1.823	1.823	Orsat good

DA-0427

H1 - 240
H2 - 108
H3 - 0

Comments:
SUS 15.1

1.331

1.550
1.779
29.7
28.2

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SAMPLE RECOVERY FIELD DATA

Method 5

Client
Location/Plant

BOLATER
CATANBA, SC

W.O. # 03917, 008, 013
Source & Location F2 Comb PWR BLR

Run No.	<u>ONE</u>						Sample Date	<u>22 JUL 08</u>	Recovery Date	<u>22 JUL 08</u>
Sample I.D.	<u>DA-DL25</u>						Analyst	<u>RJD</u>	Filter Number	<u>DA-DL25</u>
Impinger										
Contents	1	2	3	4	5	6	Imp.Total	7	Total	
Final	242	214	4					1,6		
Initial	100	100	0					300	7	
Gain	142	14	0				152	11.0	163	
Impinger Color	<u>V</u>						Labeled?	<u>Y</u>		
Silica Gel Condition	<u>✓</u>						Sealed?	<u>Y</u>		
Run No.	<u>TWO</u>						Sample Date	<u>22 JUL 08</u>	Recovery Date	<u>22 JUL 08</u>
Sample I.D.	<u>DA-DL26</u>						Analyst	<u>RJD</u>	Filter Number	<u>DA-DL26</u>
Impinger										
Contents	1	2	3	4	5	6	Imp.Total	7	Total	
Final	236	110	0					345.5		
Initial	100	100	0					300	6	
Gain	136	10	0				146	14.9	160.9	
Impinger Color	<u>V</u>						Labeled?	<u>Y</u>		
Silica Gel Condition	<u>✓</u>						Sealed?	<u>Y</u>		
Run No.	<u>THREE</u>						Sample Date	<u>22 JUL 08</u>	Recovery Date	<u>22 JUL 08</u>
Sample I.D.	<u>DA-DL27</u>						Analyst	<u>RJD</u>	Filter Number	<u>DA-DL27</u>
Impinger										
Contents	1	2	3	4	5	6	Imp.Total	7	Total	
Final	240	108	0					311.0		
Initial	100	100	0					300	8	
Gain	140	8	0				148	10.2	158.2	
Impinger Color	<u>V</u>						Labeled?	<u>Y</u>		
Silica Gel Condition	<u>✓</u>						Sealed?	<u>Y</u>		

Check COC for Sample IDs of Media Blanks

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MANAGERS DESIGN/CONSULTANTS

RUN DATA

Number 1

Client: **Bowater**
Location: **Catawba, SC**
Source: **No. 2 CB**
Calibration: **1**

Project Number: **03917.008.013**
Operator: **Simpkins**
Date: **22 Jul 2008**

Time	O2		CO2	
	mv	%	mv	%
Starting time 14:32				
14:32:38	4811	12.0	3366	8.1
14:32:53	4810	12.0	3364	8.1
14:33:08	4808	12.0	3362	8.1
14:33:23	4804	12.0	3361	8.1
14:33:38	4811	12.0	3356	8.1
14:33:53	4810	12.0	3353	8.1
14:34:08	4813	12.0	3347	8.1
14:34:23	4817	12.0	3338	8.1
14:34:38	4821	12.0	3336	8.1
Run Avg	4812	12.0	3354	8.1



RUN DATA

Number 2

Client: **Bowater**
Location: **Catawba, SC**
Source: **No. 2 CB**
Calibration: **1**

Project Number: **03917.008.013**
Operator: **Simpkins**
Date: **22 Jul 2008**

Time	O2		CO2	
	mv	%	mv	%
Starting time 16:23				
16:24:08	4735	11.8	3382	8.2
16:24:23	4734	11.8	3389	8.2
16:24:38	4735	11.8	3385	8.2
16:24:53	4735	11.8	3383	8.2
16:25:08	4735	11.8	3384	8.2
16:25:23	4743	11.8	3386	8.2
16:25:38	4743	11.8	3389	8.2
16:25:53	4735	11.8	3391	8.2
Run Avg	4737	11.8	3386	8.2

RUN DATA

Number 3

Client: **Bowater**
Location: **Catawba, SC**
Source: **No. 2 CB**
Calibration: **1**

Project Number: **03917.008.013**
Operator: **Simpkins**
Date: **22 Jul 2008**

Time	O2		CO2	
	mv	%	mv	%
Starting time 18:40				
18:41:04	4756	11.9	3344	8.1
18:41:19	4750	11.8	3353	8.1
18:41:34	4749	11.8	3358	8.1
18:41:49	4748	11.8	3358	8.1
18:42:04	4752	11.8	3356	8.1
18:42:19	4749	11.8	3358	8.1
18:42:34	4748	11.8	3357	8.1
18:42:49	4750	11.8	3356	8.1
Run Avg	4750	11.8	3355	8.1

CALIBRATION

Number 1

Client: **Bowater**
Location: **Catawba, SC**
Source: **No. 2 CB**

Project Number: **03917.008.013**
Operator: **Simpkins**
Date: **22 Jul 2008**

Starting Time: 14:26

O2

Method: EPA 3A
Calibration Type: Linear Regression

Calibration Results		
%	Cylinder ID	Result, mv
Zero	-	38
10.0	SG 9154263	4044
19.9	CC 105613	7940

Curve Coefficients

Slope	Intercept	Corr. Coeff.
397.1 ✓	49.6 ✓	>0.9999

CO2

Method: EPA 3A
Calibration Type: Linear Regression

Calibration Results		
%	Cylinder ID	Result, mv
Zero	-	89
10.1	SG 9154263	4211
19.8	CC 105613	7999

Curve Coefficients

Slope	Intercept	Corr. Coeff.
399.6 ✓	117.6 ✓	0.9999

β

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SOLUTIONS

CALIBRATION ERROR

Number 1

Client: Bowater
Location: Catawba, SC
Source: No. 2 CB

Project Number: 03917.008.013
Operator: Simpkins
Date: 22 Jul 2008

Starting Time: 14:26

O2

Method: EPA 3A

Slope 397.1

Intercept 49.6

Standard, %	Response, mV	%	Error, %
Zero	38	0.0	0.0 ✓
10.00	4044	10.1	0.5 ✓
19.9	7940	19.9	0.0 ✓

CO2

Method: EPA 3A

Slope 399.6

Intercept 117.6

Standard, %	Response, mV	%	Error, %
Zero	89	-0.1	-0.5 ✓
10.10	4211	10.2	0.5 ✓
19.8	7999	19.7	-0.5 ✓

YB

ANALYZER INFORMATION

Client: Bowater
Location: Catawba, SC
Source: No. 2 CB

Project Number: 03917.008.013
Operator: Simpkins
Date: 22 Jul 2008

File Name: C:\Data\Bowater- Catawba, SC\Compliance 2008\No. 2 CB bags.cem
Computer: WSAUB60 **Trailer:** 261

Analog Input Device: **Keithley KPCMCIA 16AI Card**

Channel 1

Analyte	O2
Method	EPA 3A, Using Bias
Analyzer Make, Model & Serial No.	CAI 300; IL12025
Full-Scale Output, mv	10000
Span Concentration, %	19.9

Channel 2

Analyte	CO2
Method	EPA 3A, Using Bias
Analyzer Make, Model & Serial No.	CAI 300; 1L12025
Full-Scale Output, mv	10000
Span Concentration, %	19.8



*On-Site PM Analysis Data Sheet

Client Bowater
Source No. 2 CB

Day and Date Tues 7-22-8
Name TS

Filter Weights

Run No.	1	2	3	
Filter No.	DA 0125	DA 0126	DA 0127	
Wt. No. 1	33.7436	39.9477	44.1266	
Wt. No. 2	33.7371	39.9523	44.1331 ✓	
Wt. No. 3	33.7380	39.9481 ✓	44.1331 ✓	
Wt. No. 4	33.7577	39.9481 ✓		
	33.7458 ✓			
	33.7453 ✓			

Beaker Weights – Front Half

Run No.	1	2	3	4
Beaker No.	1-07	2-07	3-07	4-07
Volume (mls)	140	100	100	100
Wt. No. 1	111.1720 ✓	123.3552	112.6732	124.4878
Wt. No. 2	111.1716 ✓	123.3572 ✓	112.6752 ✓	124.4890
Wt. No. 3		123.3574 ✓	112.6750 ✓	124.4892
Wt. No. 4				

Beaker Weights – Back Half

Run No.			
Beaker No.			
Volume (mls)			
Wt. No. 1			
Wt. No. 2			
Wt. No. 3			
Wt. No. 4			

*This data sheet must be submitted with data package

Notes:



APPENDIX D

QUALITY CONTROL DATA



APPENDIX E
PROCESS OPERATING/PRODUCTION DATA

No. 2 Combination Boiler
Process Data

Combination Boiler No. 2

Start Time 07/22/08 01:42 PM
End Time 07/22/08 02:51 PM

RUN NO. 1	% opacity %	Steam Load mpph	Bark tph	Oil gpm	Gas mcfh	TDF tph
	37ai293b.; 37cf278.pv	c2bf.pv	37fc280.pv	37fc281.pv	13sc001.pv	
22-Jul-08 13:42:00	5.8	286.6	41.8	8.8	0.0	0.7
22-Jul-08 13:48:00	5.0	275.5	38.6	8.8	0.0	0.7
22-Jul-08 13:54:00	5.1	280.6	38.6	9.9	0.0	0.7
22-Jul-08 14:00:00	5.7	315.9	44.2	8.9	0.0	0.7
22-Jul-08 14:06:00	5.6	309.0	46.6	8.7	0.0	0.7
22-Jul-08 14:12:00	6.7	324.5	47.8	8.0	0.0	0.7
22-Jul-08 14:18:00	5.7	302.6	43.1	9.0	0.0	0.7
22-Jul-08 14:24:00	5.8	291.0	39.0	9.8	0.0	0.7
22-Jul-08 14:30:00	6.2	314.2	44.9	10.4	0.0	0.7
22-Jul-08 14:36:00	6.0	302.2	41.4	10.3	0.0	0.7
22-Jul-08 14:42:00	8.3	300.2	41.2	10.2	0.0	0.7

Average 6 300.2 42.5 9 0.0 0.7

			btu/hr
Bark	42.5 TPH	4350 btu / lb	369,513,912
Oil	9 GPM	148000 btu / gal	83,063,389
Gas	0.0 MCFH	1031 btu / cf	0
TDF	0.3 tph	15500 btu / lb	10,195,972
		462,773,272 total heat input	110%

Start Time 07/22/08 03:24 PM
End Time 07/22/08 04:30 PM

RUN NO. 2	% opacity %	Steam Load mpph	Bark tph	Oil gpm	Gas mcfh	TDF tph
	37ai293b.; 37cf278.pv	c2bf.pv	37fc280.pv	37fc281.pv	13sc001.pv	
22-Jul-08 15:24:00	4.1	297.1	41.3	10.3	0.0	0.5
22-Jul-08 15:30:00	7.1	328.3	45.2	9.8	0.0	0.7
22-Jul-08 15:36:00	9.5	351.3	50.5	9.7	0.0	0.7
22-Jul-08 15:42:00	6.8	358.7	51.6	10.0	0.0	0.7
22-Jul-08 15:48:00	6.0	318.6	45.8	10.1	0.0	0.7
22-Jul-08 15:54:00	7.7	335.2	47.4	10.1	0.0	0.7
22-Jul-08 16:00:00	6.3	324.0	46.7	10.1	0.0	0.7
22-Jul-08 16:06:00	5.0	306.3	44.9	9.4	0.0	0.7
22-Jul-08 16:12:00	8.5	283.9	40.9	8.4	0.0	0.7
22-Jul-08 16:18:00	6.5	279.8	38.9	9.9	0.0	0.7
22-Jul-08 16:24:00	8.2	286.7	39.2	10.3	0.0	0.7

Average 7 315.4 44.8 10 0.0 0.6

			btu/hr
Bark	44.8 TPH	4350 btu / lb	389,372,791
Oil	10 GPM	148000 btu / gal	87,328,028
Gas	0.0 MCFH	1031 btu / cf	0
TDF	0.3 tph	15500 btu / lb	9,908,559
		486,609,376 total heat input	116%

Start Time 07/22/08 05:00 PM
End Time 07/22/08 06:06 PM

RUN NO. 3	% opacity %	Steam Load mpph	Bark tph	Oil gpm	Gas mcfh	TDF tph
	37ai293b.; 37cf278.pv	c2bf.pv	37fc280.pv	37fc281.pv	13sc001.pv	
22-Jul-08 17:00:00	6.1	278.2	36.3	11.4	0.0	0.7
22-Jul-08 17:06:00	6.1	286.7	38.8	9.6	0.0	0.7
22-Jul-08 17:12:00	6.6	301.3	43.4	8.8	0.0	0.7
22-Jul-08 17:18:00	5.6	278.3	40.3	8.2	0.0	0.8
22-Jul-08 17:24:00	5.7	286.6	41.7	8.4	0.0	1.3
22-Jul-08 17:30:00	7.2	281.8	41.8	9.0	0.0	1.3
22-Jul-08 17:36:00	9.7	306.2	43.5	9.0	0.0	1.3
22-Jul-08 17:42:00	10.0	323.1	47.5	8.2	0.0	1.2
22-Jul-08 17:48:00	9.0	287.8	44.6	7.6	0.0	0.1
22-Jul-08 17:54:00	8.9	326.7	46.9	8.4	0.0	0.6
22-Jul-08 18:00:00	4.0	281.5	41.5	8.4	0.0	0.0

Average 7 294.4 42.4 9 0.0 0.8

			btu/hr
Bark	42.4 TPH	4350 btu / lb	388,829,526
Oil	9 GPM	148000 btu / gal	78,310,385
Gas	0.0 MCFH	1031 btu / cf	0
TDF	0.4 tph	15500 btu / lb	12,246,229
		459,386,139 total heat input	109%

TDF is for both No. 1 and No. 2 Combination Boilers.

From: Hinson, Will L (Catawba) [mailto:Will.Hinson@AbitibiBowater.com]
Sent: Thursday, August 14, 2008 1:30 PM
To: Hornsby, Natalie
Subject: Fuel Factor Calc 07_08

Fuel Factor Calculations

Run 1

Source	% of heat input	value	total
Bark	0.80	9600	7680
Oil	0.18	9190	1654
Gas	0.00	8710	0
TDF	0.02	15500	310
			9644

Run 2

Source	% of heat input	value
Bark	0.80	9600
Oil	0.18	9190
Gas	0.00	8710
TDF	0.02	15500
		9644

Run 3

Source	% of heat input	value
Bark	0.80	9600
Oil	0.17	9190
Gas	0.00	8710
TDF	0.03	15500
		9708

END
OF
DOCUMENT